pounds his theories in a language full of incomprehensible cant, glorying in paradoxes, flying from one topic to another at a most erratic gait, and beginning and ending nowhere. The whole is strongly suggestive of a semi-morbid condition of mind, and will probably have a charm for minds of neurotic temperament that delights in the apparent and exclusive possession of an un-understood mystery. The redeeming point of the volume is its refusal to ally itself with coarse, physical deceptions, and thus gives no opportunity for preying upon the liberality of the credulous.

— The changes in the elevation of the Caspian Sea and the Baltic have been discussed by Dr. Brückner in a lecture delivered at the meeting of the German Meteorological Society at Karlsruhe, and by W. Seibt ('Das Mittelwasser der Ostsee bei Travemünde'). Both authors show by their separate methods that the influence of the wind upon lakes has been overrated, and that the annual rainfall regulates the amount of water in lakes and seas communicating with the ocean through narrow channels. The amount of water carried by the Volga regulates the elevation of the surface of the Caspian Sea, and the same is the case with the Black Sea and its affluents. Brückner shows that the easterly winds of May and the westerly winds of July and August have an influence upon the Baltic, but the thorough discussion of the gauge observations at Travemünde by W. Seibt proves that only in April, May, and September the height of the water corresponds to the direction and pressure of the wind. It appears that the volume of water of the Baltic is subject to periodical changes. While Brückner believes that this is entirely due to the changes of the annual rainfall, Seibt concludes that a periodical annual tide exists in the ocean, which is observed only in seas in which the daily tide is insignificant.

— Over 60,000,000 caterpillar-cocoons were destroyed on the trees in Washington during the spring, so that the city will not suffer from this pest this year as badly as formerly.

— U. S. Consul Siler at Cape Town, Africa, has sent to the Department of State an interesting report on leprosy in South Africa. He says that he has recently read in American papers of the existence of leprosy on the Pacific coast, with expressions of fear that the disease may become general. The disease, he states, is not uncommon in South Africa.

— The sitting statue of Bowditch the navigator, executed in 1847 by Ball Hughes, and long one of the most celebrated monuments in Mount Auburn cemetery, Cambridge, has just been replaced by a new casting from the foundry of Gruet jeune of Paris, the old showing some signs of injury due to defective founding.

LETTERS TO THE EDITOR.

*** The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

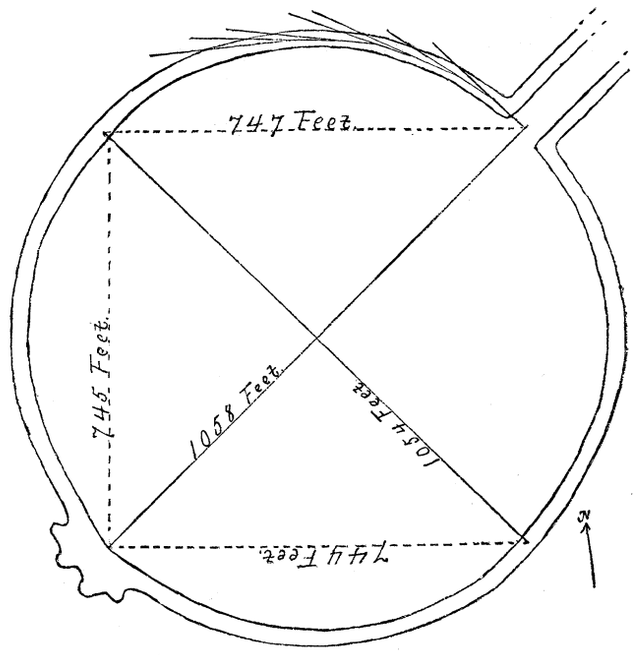
Ohio Mounds.

HAVING recently made a survey on behalf of the Bureau of Ethnology, of some of the circles of the ancient works of Ohio, I wish to call attention, by permission, to one or two facts brought to light.

This can best be done by an illustration, for which purpose the 'Observatory Circle' of the works at Newark, Licking County, is selected (see 'Ancient Monuments,' by Squier and Davis, Plate xxv. F.).

Running this by means of short chords of seventy-five feet in length, taking the middle line of the top of the wall, I found the number to be 44, and twelve feet in addition, or the perimeter of the polygon 3,312 feet. The course of each chord was taken. While the variation from one to the other, if the figure were a true circle, should be about 8° 9′, it was found to vary from one to fifteen degrees. But, somewhat to my surprise, it was found that these variations compensated each other in short distances, so that in measuring the quarters they almost wholly disappear, the angle of the first quarter being 44° 52′, and its chord 747 feet; the angle of the second quarter 45°, and its chord 745 feet; of the third quarter, 44° 52′, and the chord 744 feet; the fourth quarter was not measured owing to obstructions. It is therefore apparent that the figure as a whole is very near a true circle.

But the most singular fact is presented by the diameters. These, as taken by careful measurements from the quarter-stations, are



respectively 1,054 and 1,058 feet, the average of which is 1,056 feet, precisely sixty-four poles, or sixteen chains.

As there are several other circles of the size, this singular coincidence is, to say the least, interesting. JAMES D. MIDDLETON.

Youngsville, Penn., June 22.

Waterspouts.

BELIEVING that every natural phenomenon, especially when unusual or little studied, is worthy of record, we have put down a few notes about a series of waterspouts which passed here on Monday, May 23, shortly after noon. One of us saw at one time, from an elevation of about one hundred and fifty feet, as many as nine in various stages of their formation; the other, eight, at an elevation of fifty feet, we being about half a mile apart; and some persons claim to have seen twelve in all.

Alassio is situated on a bay, or rather roadstead, which is about five miles from headland to headland in a straight line: from that line to our villas is at least two miles.

On the 22d there was a severe storm throughout north Italy, extending from Padua to Turin, accompanied by hail and frost. The mountains behind Genoa, and all along the coast, were again covered with snow. This storm appeared to divide, and while going through the mountains to the north, not seen from here, passed us about three miles out at sea, at about 11 A.M. Then there was no wind; the sea was unusually smooth in the bay, but the line of the storm was strongly marked, and the roaring of the waves was distinctly heard. A little later we had a very slight shower.

The morning of the 23d was unusually electrical, so much so as to make every one feel uneasy and restless. The wind dropped, and there was a dead calm. At a little after twelve we were called out by our gardeners and servants, and, looking out at sea, saw a long black cloud lying in a straight line across the bay, from which long descending tubes — some straight, as if drawn with a rule, others twisted like snakes — were moving rapidly in procession in a south-westerly direction. The surface of the sea boiled, and the foam and spray rose many feet into the air with a loud roaring plainly heard on land. In some cases, as these tubes approached the sea with their dangling ends, the water seemed gradually to rise and meet them. In other cases the ends swayed to and fro above the waves, either forming no connection with them, or having already begun to break up. In nearly every case the

hollow tube was distinctly visible, the centre being clear like glass, while the outside was wrapped in a smoke-like mist. Even with the naked eye we could distinctly see a spiral motion on the inside of the tube, as if water were either ascending or descending, in which direction it was impossible to tell. Beyond the waterspouts, between the cloud and the sea, a blue sky with sunlit cumulus clouds was plainly seen. These tubes moved at the rate of more than thirty miles an hour, judging from the time ordinarily taken by steamers in crossing the same space. Estimates of the height of the cloud are difficult to make, but at least half the tubes were seen over the promotory of Capo delle Mele, which is about one thousand feet high, and distant about five miles, as the crow flies, from the point of observation.

The phenomenon caused a great panic among the inhabitants, owing to the prediction of Falb that there would be a violent earthquake on that day.

There was subsequently a slight storm of hail and rain; but farther westward, on the coast, the damage done was considerable, at San Remo secular olive trees being torn up by the roots and whirled away. No waterspout is, however, known to have burst on the land.

MAURICE HOWARD,
EUGENE SCHUYLER.

Alassio, Riviera, Italy, May 26.

How to make Meteorological Observations at a Distance above the Earth's Surface.

THE progress of meteorology in the beaten tracks of the usual observations is very satisfactory; but there are several new lines of work, that can be and ought to be carried out, that receive scarcely more than an occasional mention, or a regret that somebody does not do something in the matter. The observation of the conditions of the atmosphere above the earth's surface is perhaps the most important of these questions. I know of no meteorological data so much to be desired as that which is now obtained for short, irregular intervals, by the occasional ascent of a balloon. This, however, is a very expensive and risky method of observation, and has always been looked upon as a novelty rather than a regular method.

The few observations made in balloon-voyages, together with those obtained by means of an occasional captive-balloon ascent, are very valuable, and have been used over and over again in determining constants. The great expense of even a captive balloon, where the observer must go up, has prevented their general introduction into meteorological work.

It has often been proposed to send up self-registering instruments in smaller captive balloons; but, if this has been done, I have not seen accounts of it. The lighter forms (metal thermometer and aneroid barometer) could undoubtedly be used in this way; but the ordinary registering-apparatus is very delicate, and the swaying of the balloon might disturb the adjustments; besides, the original cost of the apparatus is considerable, and, moreover, any damage could not be easily repaired.

In place of a balloon, the kite has been suggested, and E. Douglass Archibald has made some interesting preliminary experiments with this method.

I have seen only the account of his experiments as given in the *Meteorologische Zeitschrift* for 1885 (p. 47); but in this paper there are references to *Nature* (Nov. 20, 1884) and *Quarterly Journal* (January, 1883).

Mr. Archibald flies two kites, the one to steady the other. He carried on systematic observations with an anemometer (six inches in diameter) for a year, and finally got results for a height of eleven hundred feet above the ground.

I saw this paper on Mr. Archibald's work a few days ago for the first time; but it interested me very much, as I had been considering the same problem. A year and a half ago I devised a form of apparatus that would seem to promise good results; but it was only some months ago that I suggested the following detailed construction, which is given here for the benefit of any who might wish to carry on any such experiments.

The general form is seen in Fig. 1, and consists of a balloon (5) which carries a basket (4) suspended from beneath, and the basket carrying an anemometer (6) with a weight below it.

The balloon is held captive by a three-strand (insulated) wire, which is wound around a reel (2), and passes to a table (1), where the battery and keys are mounted.

The reel (2) must be firmly anchored, and the wires arranged so there will be no danger from electric currents. A cloth ring, with the length of rope (from the balloon) written on it, can be glued to the rope at every hundred feet, so that the observer can see just how much rope is out; and, by means of some instrument for measuring vertical angles, the altitude of the balloon can be measured and the height of the balloon computed.

The apparatus as shown in Fig. 2 might also be sent up in a balloon held captive by an ordinary rope, if a small bichromate-of-potash battery, with closed hard-rubber cells and a clockwork to break the circuit every five or ten minutes, is also included. The whole apparatus might also be sent up on a kite, if one wished to risk the instruments, which would be destroyed by the sudden falling of the kite.

The method here given allows the observer to control the time of observation, and would seem best on that account. The registering apparatus as shown in Fig. 2 is practically Professor Wild's system, with some important differences, however. I was for a long

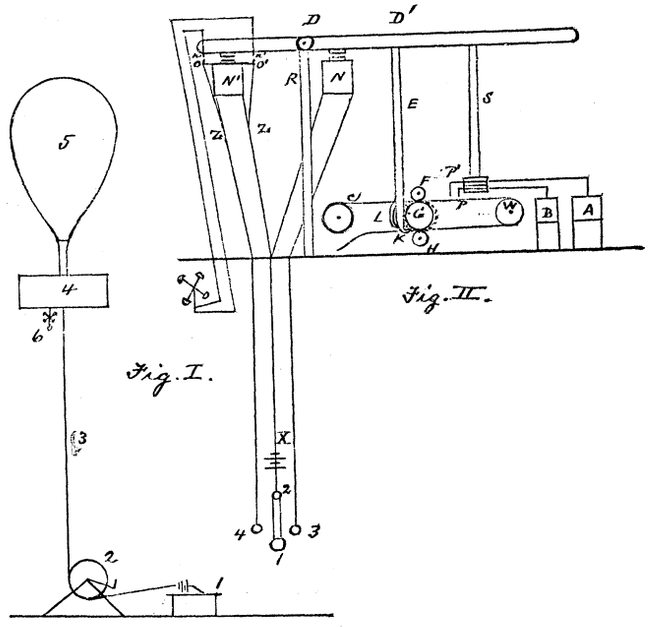


Fig. II.

Fig. I.

time troubled about the means of moving the registration-paper without clockwork, but Wild's method answers the purpose very well. It must be borne in mind that only a very general description of the apparatus is given here.

The following apparatus is to be placed in the basket suspended from the lower end of the balloon. The basket must be so arranged that the air will have free passage through it when the balloon is ascending or descending. The balloon need only be large enough to carry a few pounds (fifty) to the height of half a mile: it is impossible to foretell just how much the whole apparatus would weigh. A hair hygrometer could also be added to the instruments, but has not been put in the accompanying sketch.

The careening of the balloon would have no effect on the working of the apparatus as shown here, because nothing of the registration arrangement is free to move except the pointers. In making an apparatus, the best arrangement would be somewhat different from the sketch given here.

The main advantage of this apparatus is the cheapness with which an ordinary aneroid barometer and metal thermometer could be applied to the purpose.

In Fig. 2, R is a stand on which the long lever D rests, and turns in the vertical. N and N' are two electro-magnets which attract D. When the key 1 joins 2-3, then N acts, and draws D down on the right. When the key 1 joins 2-4, then N' acts, and pushes D up on the right. Self-registering paper is coiled on the wheel c, and one end of the paper passes between the rollers F and G, and then